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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/675,811	09/29/2000	Ron Carmel	immr-056/00us	1164

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EXAMINER

FERRIS III, FRED O

ART UNIT	PAPER NUMBER
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2128

DATE MAILED: 02/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/675,811

Applicant(s)

CARMEL ET AL.

Examiner

Fred Ferris

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 11-14 is/are allowed.
- 6) ☒ Claim(s) 3-8 and 15-20 is/are rejected.
- 7) ☐ Claim(s) 9 and 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/20/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Claims 3-20 have been presented for examination based on applicant's amendment filed on 20 September 2004. Applicants have canceled claims 1-2. Claims 3-8 and 15-20 have been rejected by the examiner. Claims 9 and 10 are objected to. Claims 11-14 have been allowed over the prior art of record.

Response to Arguments

2. Applicant's arguments filed on 20 September 2004 have been fully considered.

Regarding 101, 112(2), and 102/103 rejection of claims 1 and 2: Applicants have now cancelled claims 1 and 2 rendering these previous rejections moot. (Please see rejections relating to new claims 3-20 below)

Regarding applicant's IDS submitted 20 September 2004: It is noted that applicant's IDS submitted 20 September 2004 includes non-patent literature documents that have not been provided by applicants.

C.F.R. § 1.98 recites the following:

"§ 1.98 Content of information disclosure statement.

(a) Any information disclosure statement filed under § 1.97 shall include:

(1) A list of all patents, publications, applications, or other information submitted for consideration by the Office;

(2) A legible copy of:

(i) Each U.S. patent application publication and U.S. and foreign patent;

(ii) Each publication or that portion which caused it to be listed;

(iii) For each cited pending U.S. application, the application specification including the claims, and any drawing of the application, or that portion of the application which caused it to be listed including any claims directed to that portion; and

(iv) All other information or that portion which caused it to be listed"

While copies of U.S. Patents and U.S. Patent Applications need not be submitted under the PTO's electronic filing system, legible copies of any Non-patent literature (NPL) are required under C.F.R. § 1.98. Accordingly, the examiner has not considered the NPL documents listed in applicant's IDS filed 20 September 2004.

Priority

3. *Applicant's claim for priority benefit to United States Provisional Patent Application Serial No. 60/157,272 filed 01 October 1999 is acknowledged.*

Drawings

4. *The informal drawings submitted on 28 September 2000 are acceptable for examination purposes only. New formal drawings will be required when the case is allowed.*

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 3-5, and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,896,139 issued to Strauss in view of U.S. Patent 6,266,053 issued to French et al.

Independent claim 1 is drawn to:

Processor medium (code) with instructions causing processor to:

- Analyze first scene graph with interconnecting nodes representing scene
- Analyze second scene graph with interconnecting nodes representing scene
- Independently associate each interconnected nodes of first and second scene graphs with neutral scene graph

Regarding independent claim 3: Strauss teaches analyzing (by comparison of node properties, CL3-L33-50, CL4-L10-37) the interconnecting nodes (Figs. 1, 5-7) of multiple scene graphs (i.e. an original (first) scene graph, and a new (second) scene graph, CL4-L55-65, CL6-L21-33) representing the scenes of a graphic image. (Figs. CL1-L63-CL2-L27, CL2-L45-51)

Strauss does not explicitly teach the synchronization of two asynchronous scene graphs (neutral scene graph).

French teaches time based mapping (CL12-L53-63, Fig. 2) between scene graph nodes (CL14-L60-CL15-L64). Applicant's specification (pages 5-7) defines a Neutral Scene Graph (NSG) as two synchronized scene graphs (graph A and graph B). The examiner has therefor interpreted the time based scene graph mapping disclosed by French to be functionally equivalent to the NSG process of associating the

interconnecting nodes, as claimed by applicants. (Abstract, Summary, CL18-7-35, CL19-L1-20, Fig. 14)

It would have been obvious to one having ordinary skill in the art at the time the claimed invention was made, to modify the teachings of Strauss relating to analyzing and associating the nodes of multiple scene graphs, with the teachings of French relating to time based mapping of scene graphs, to realize the claimed invention. An obvious motivation exists since this area of technology is highly competitive with virtual reality simulators available in the market place and large amounts of money being spent in product development and improvement. (See "Haptic Sculpting of Dynamic Surfaces", F. Dachille, 1999 Symposium on Interactive 3D Graphics, pp. 103-110, ACM April 1999 - conclusion, for example) Accordingly, a skilled artisan would have made an effort to become aware of what capabilities had already been developed in the market place and, hence, would have knowingly modified the teachings of Strauss with the teachings of French in order to reduce development time and cost.

Per dependent claim 4: French teaches transforming the topology between scene graphs (CL18-L17-23) and would have been knowingly implemented by a skilled artisan using the reasoning cited above.

Per dependent claim 5: French teaches synchronization of asynchronous scene graphs (CL19-L21-CL20-L23) as previously cited above.

Per dependent claims 7 and 8: These claims merely require updating the scene graph information based on the relative rate between the first and second scene graphs and the actual frame rate. French discloses updating synchronization parameters of

scene graphs based on both actual frame rate (CL15-L35-CL16-L19) and the relative rate between original (first) and new (second) scene graphs (CL18-L15-45), and would have been knowingly implemented by a skilled artisan using the reasoning cited above.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,896,139 issued to Strauss in view of U.S. Patent 6,266,053 issued to French et al in further view of U.S. Patent 6,282,455 issued to Engdahl.

Per dependent claim 6: As noted above, the limitations of independent claim 3 are rendered obvious in view of the teachings of Strauss and French. Specifically, Strauss teaches analyzing (by comparison of node properties, CL3-L33-50, CL4-L10-37) the interconnecting nodes (Figs. 1, 5-7) of multiple scene graphs (i.e. an original (first) scene graph, and a new (second) scene graph, CL4-L55-65, CL6-L21-33) representing the scenes of a graphic image. (Figs. CL1-L63-CL2-L27, CL2-L45-51)

Strauss does not explicitly teach the synchronization of two asynchronous scene graphs (neutral scene graph).

French teaches time based mapping (CL12-L53-63, Fig. 2) between scene graph nodes (CL14-L60-CL15-L64). Applicant's specification (pages 5-7) defines a Neutral Scene Graph (NSG) as two synchronized scene graphs (graph A and graph B). The examiner has therefor interpreted the time based scene graph mapping disclosed by French to be functionally equivalent to the NSG process of associating the interconnecting nodes, as claimed by applicants. (Abstract, Summary, CL18-7-35, CL19-L1-20, Fig. 14)

It would have been obvious to one having ordinary skill in the art at the time the claimed invention was made, to modify the teachings of Strauss relating to analyzing and associating the nodes of multiple scene graphs, with the teachings of French relating to time based mapping of scene graphs, to realize the claimed invention. An obvious motivation exists since this area of technology is highly competitive with virtual reality simulators available in the market place and large amounts of money being spent in product development and improvement. (See "Haptic Sculpting of Dynamic Surfaces", F. Dachille, 1999 Symposium on Interactive 3D Graphics, pp. 103-110, ACM April 1999 - conclusion, for example) Accordingly, a skilled artisan would have made an effort to become aware of what capabilities had already been developed in the market place and, hence, would have knowingly modified the teachings of Strauss with the teachings of French in order to reduce development time and cost.

Strauss and French further do not explicitly teach the second scene graph being a haptic scene graph as recited in dependent claim 6.

Engdahl teaches a system where object images are represented as scene graphs that include haptic objects. (CL4-L9-17)

It would have further been obvious to one having ordinary skill in the art at the time the claimed invention was made, to modify the teachings of Strauss and French as noted above, with the teachings of Engdahl relating to scene graphs that include haptic objects, to realize the claimed invention. An obvious motivation exists since this area of technology is highly competitive with virtual reality simulators available in the market place and large amounts of money being spent in product development and

improvement. (See "Haptic Sculpting of Dynamic Surfaces", F. Dachille, 1999 Symposium on Interactive 3D Graphics, pp. 103-110, ACM April 1999 - conclusion, for example) Accordingly, a skilled artisan would have made an effort to become aware of what capabilities had already been developed in the market place and, hence, would have knowingly further modified the teachings of Strauss and French with the teachings of Engdahl in order to further reduce the development time and cost.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 15-20 are rejected under 35 U.S.C. 102(b) as being anticipated by "Virtual Objects in the Real World", D.G. Aliaga, Communications of the ACM, March 1997, Vol. 40, No. 3. ACM 1997.

Regarding independent claim 15: Independent claim 1 merely requires determining the LSA of a virtual representation of a real-world object based on the relative position of a second virtual representation and outputting a signal to cause a haptic effect. Aliaga discloses a virtual reality system inclusive of the ability to detect and track virtual and real object collisions (page 50, paragraphs 2-4, Figs. 2, 3a&b, 5a&b) and the ability to output a signal causing a haptic effect (Figs. 1, 2, and 4). The examiner notes that the use of local surface approximations (LSA's) is well known in

and commonly used in graphics processing systems (See Erikson, page 13, paragraph 2, Fig. 4.6, for example), and hence, would be inherent in the algorithms disclosed by Aliaga. (page 50, paragraphs 4-6, page 51, paragraphs 2-4)

Per dependent claims 16 and 17: These claims merely require that LSA's are from multiple sources and would be inherent in the algorithms disclosed by Aliaga as noted above. (page 50, paragraphs 4-6, page 51, paragraphs 2-4)

Per dependent claims 18-19: These claims include additional limitations relating to outputting "a characteristic" of the real world objects. This feature would be necessarily inherent in the algorithms disclosed by Aliaga in order to meld the virtual and real world objects. That is, the virtual world program would need knowledge of the real-world object characteristics in order to achieve the results shown in Figures 2, 3a&b, 5a&b of Aliaga. (See: Aliaga, page 51 – Optimizations)

Per dependent claim 20: Aliaga discloses detecting the likelihood of a collision occurring between the real-world object and the virtual representation on pages 51 to 52.

Allowable Subject Matter

8. *Claims 9 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Specifically, the prior art of record does not explicitly disclose the elements relating to limitations of updating the second scene graph via a separate thread form the code representing instructions, or associating the*

NSG via interconnected nodes of a **third scene graph** independent of any connections between interconnected nodes of the first scene graph as recited in dependent claims 9 and 10 respectively.

Claims 11-14 are allowed over the prior art of record. In this case the prior art does not disclose the specific sequence of steps relating to determining the existence of a **contact state** between the first and second virtual representations and determining if the contact state meets a **predetermined threshold number** of contact states in determining **the minimum drop angle parameter** as recited in the limitations of independent claim 11. Dependent claims 12-14 are deemed allowable as being dependent from independent claim 11.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 2128

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure, careful consideration should be given prior to applicant's response to this Office Action.

U.S. Patent 5,977,977 issued to Kajiya et al teaches scene graphs and collision detection in virtual environments.

U.S. Patent 6,326,964 issued to Snyder et al teaches scene graphs and collision detection in virtual environments.

"Synchronization in Multimedia Data Retrieval", A. Hac, International Journal of Network Management, Vol. 7, 33-62, 1997 teaches scene graph synchronization.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Ferris whose telephone number is 571-272-3778 and whose normal working hours are 8:30am to 5:00pm Monday to Friday. Any inquiry of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is 571-272-3700. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean Homere can be reached at 571-272-3780. The Official Fax Number is: (703) 872-9306

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